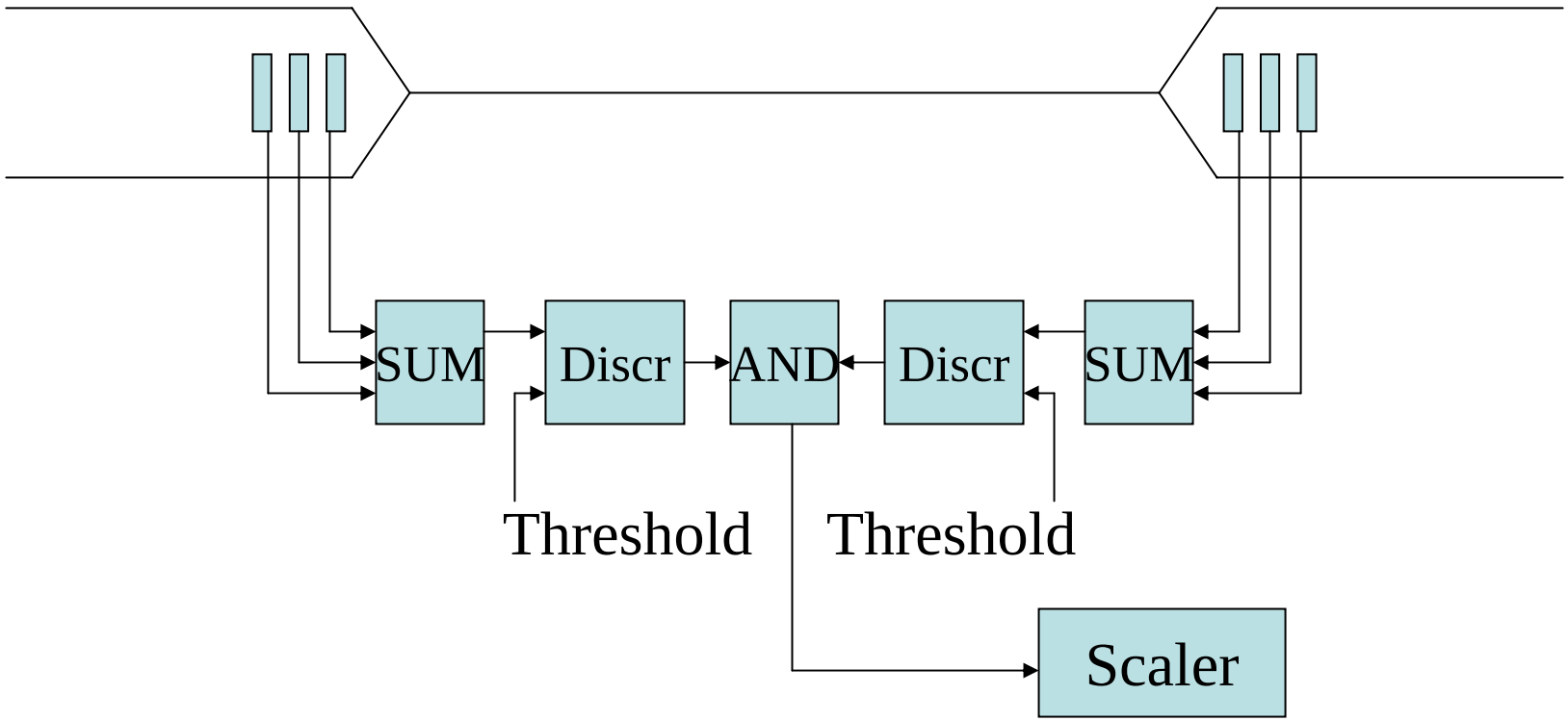
Zero Degree Calorimeters

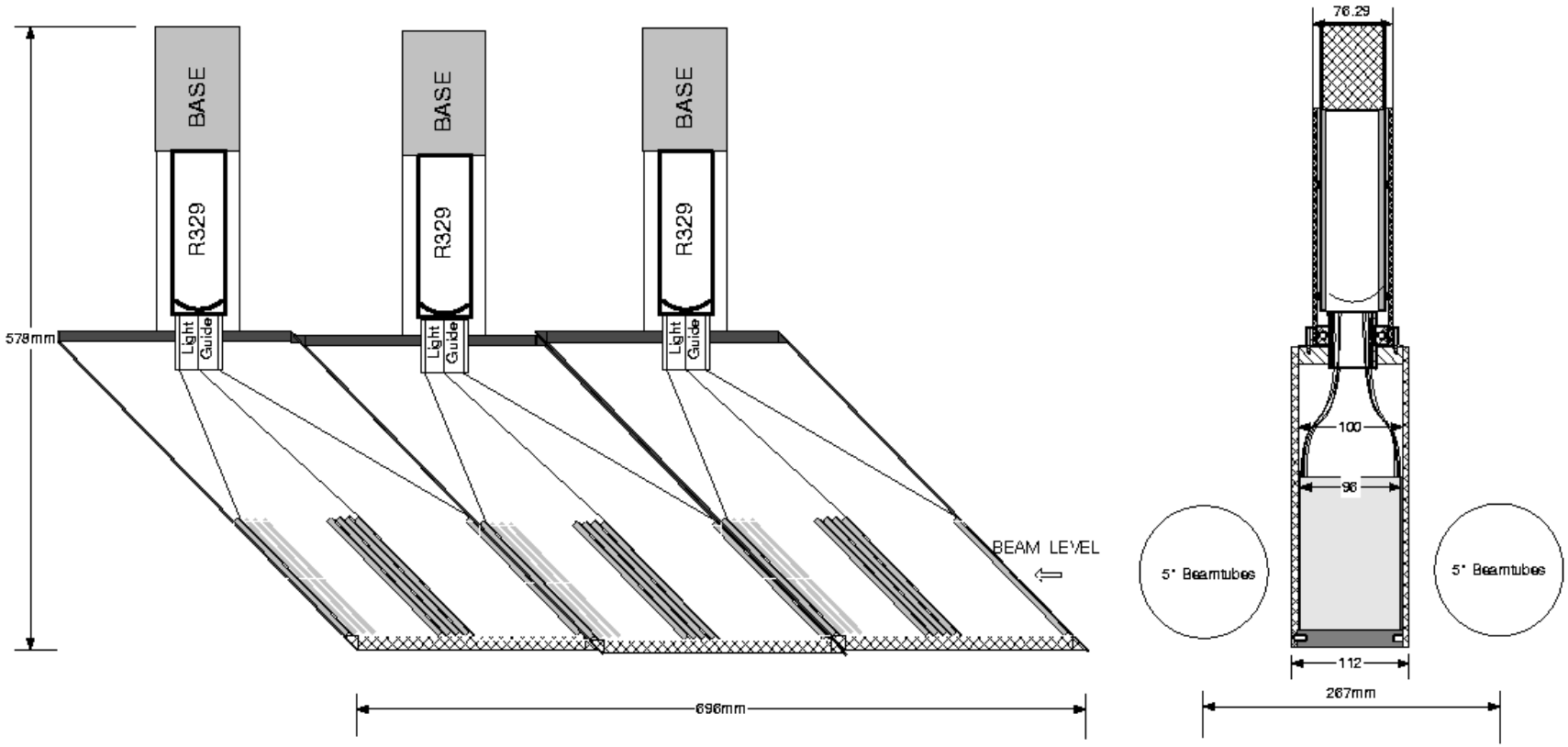
- Purpose: The Zero Degree Calorimeters (ZDCs) verify that collisions have taken place and provide rates.

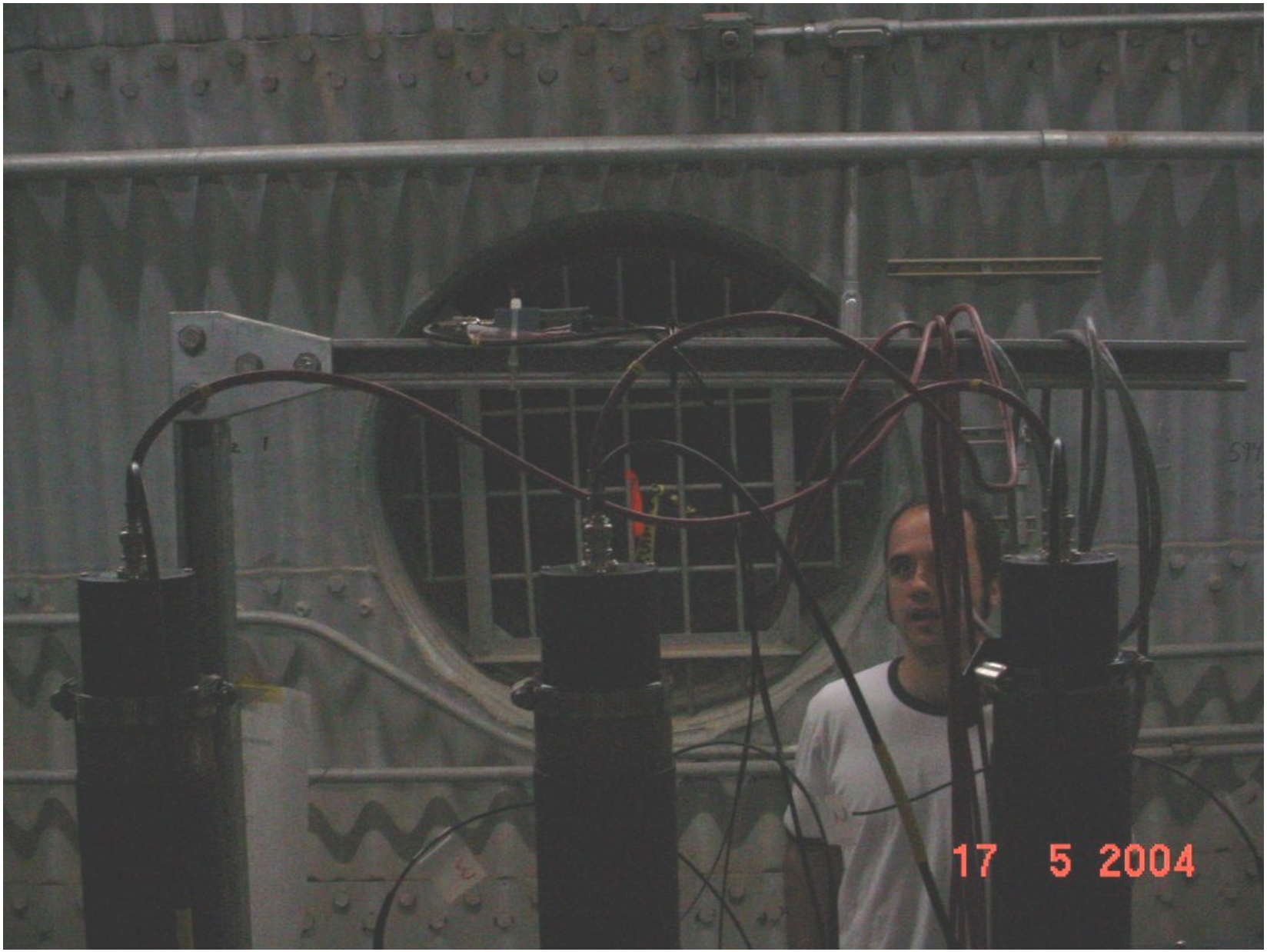
- Method: The ZDC's use photomultiplier tubes located on either side of the interaction regions, W targets and light guide combination along with associated electronics to detect neutrons produced by the collisions. The energy of the scattered neutron is highly dependent on the species and energy of collision. A symmetrical pair of neutrons is counted for each collision that takes place. Collisions may or many not happen when the beams interact.

- People: Angelika Drees physics, Justin Gullotta engineering, Instrumentation and Beam Components Group (I&BC).
- Status: The I&BC group has inherited the hardware and have been charged with documenting the systems, understanding the hardware, setting up and calibrating the systems, cross checking the systems with the experimenters rates, identifying and repairing failures.
- The present system is unwieldy and requires manual setup – at each interaction region - when collisions are taking place. This setup can only be done locally – setups change with species, energy etc. There is some debate as to how the proper threshold is determined. There is also discrepancy with the rates as determined at the experiments.

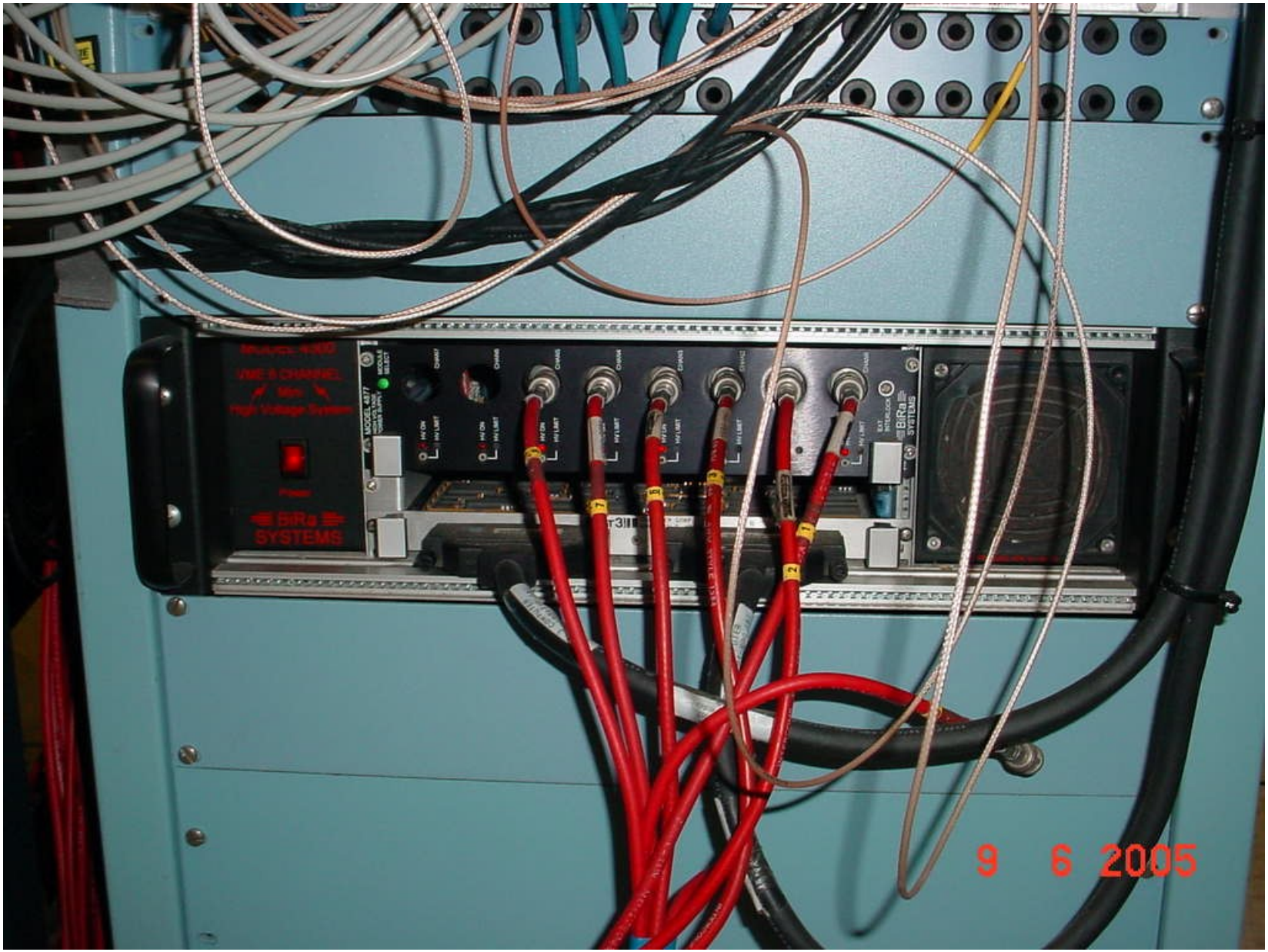
Existing ZDC Configuration




BASE
BASE
BASE
R329
R329
R329
Light Guide
Light Guide
Light Guide
578mm
BEAM LEVEL
696mm
76.29
100
98
5" Beamtubes
5" Beamtubes
112
267mm

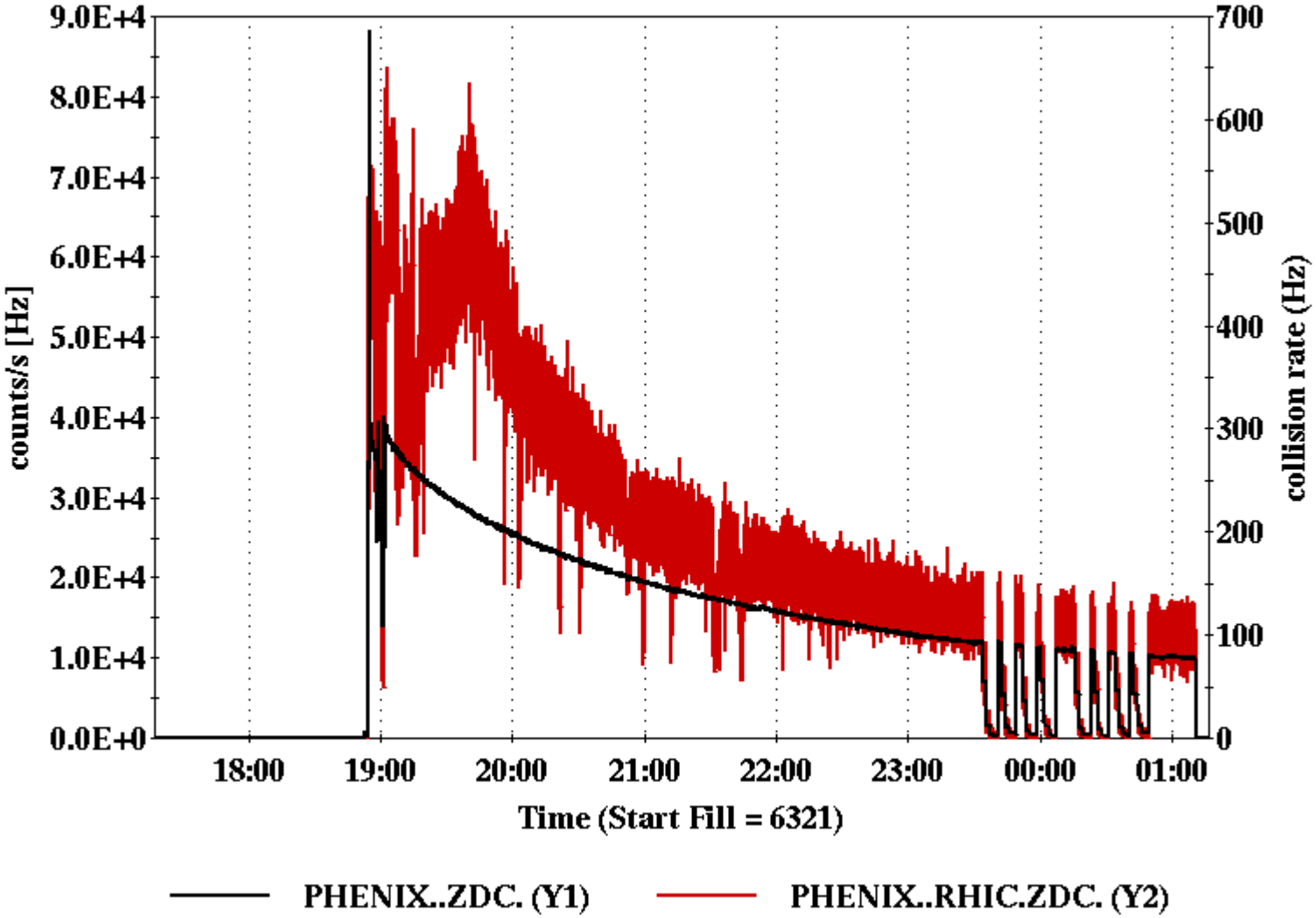

17 5 2004


9 6 2005

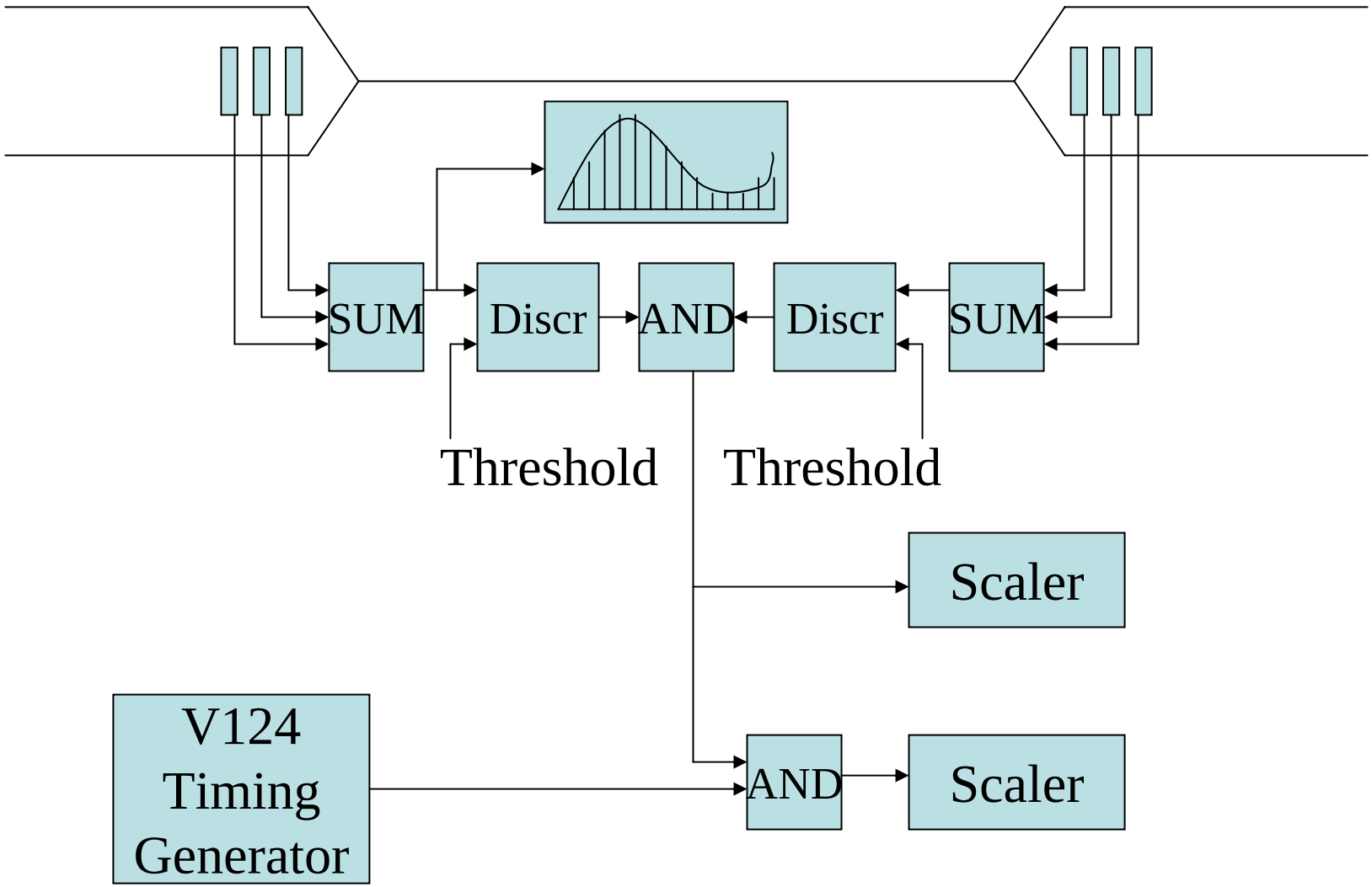

9 6 2005

- Good News: We have a new design chassis (spectrum analyzer) that will allow all of the peaks to be sampled. The plot of the frequency distribution vs amplitudes will allow precise adjustment of the threshold.
- We are also trying to synchronize the counting with a V124 to reject spurious triggers.

- Bad News: I was supposed to have the improvements in place by the beginning of the run. Efforts were hampered severely by manpower limitations due to BPM system modifications made last year, SNS completion, and etc.


9.0E+4
8.0E+4
7.0E+4
6.0E+4
5.0E+4
4.0E+4
3.0E+4
2.0E+4
1.0E+4
0.0E+0
counts/s [Hz]
700
600
500
400
300
200
100
0
collision rate (Hz)
18:00
19:00
20:00
21:00
22:00
23:00
00:00
01:00
Time (Start Fill = 6321)
PHENIX..ZDC. (Y1)
PHENIX..RHIC.ZDC. (Y2)

Future ZDC Configuration



ZDC Spectrum Analyzer